



US005484245A

United States Patent [19]

[11] Patent Number: **5,484,245**

Zopf

[45] Date of Patent: **Jan. 16, 1996**

[54] **MOTOR POWERED INTERMEDIATE CONTAINER AND METHOD OF USE**

[75] Inventor: **William D. Zopf**, Chattanooga, Tenn.

[73] Assignee: **Heil**, Chattanooga, Tenn.

[21] Appl. No.: **189,406**

[22] Filed: **Jan. 31, 1994**

4,363,588	12/1982	Stickney	414/408
4,543,028	9/1985	Bell et al.	414/408
4,722,658	2/1988	Würtz et al.	414/408
4,936,732	6/1990	Naab et al.	414/408
4,983,092	1/1991	Richards	414/408
5,266,000	11/1993	LeBlanc et al.	414/408
5,333,984	8/1994	Bayne et al.	414/408

FOREIGN PATENT DOCUMENTS

0405428	1/1991	European Pat. Off.	414/408
1531763	1/1970	Germany	414/408

Related U.S. Application Data

[63] Continuation of Ser. No. 877,488, May 1, 1992, abandoned.

[51] Int. Cl.⁶ **B65F 3/04**

[52] U.S. Cl. **414/408; 414/406; 414/501; 414/555**

[58] Field of Search 414/406, 408, 414/409, 422, 501, 549, 551-555, 740-741

References Cited

U.S. PATENT DOCUMENTS

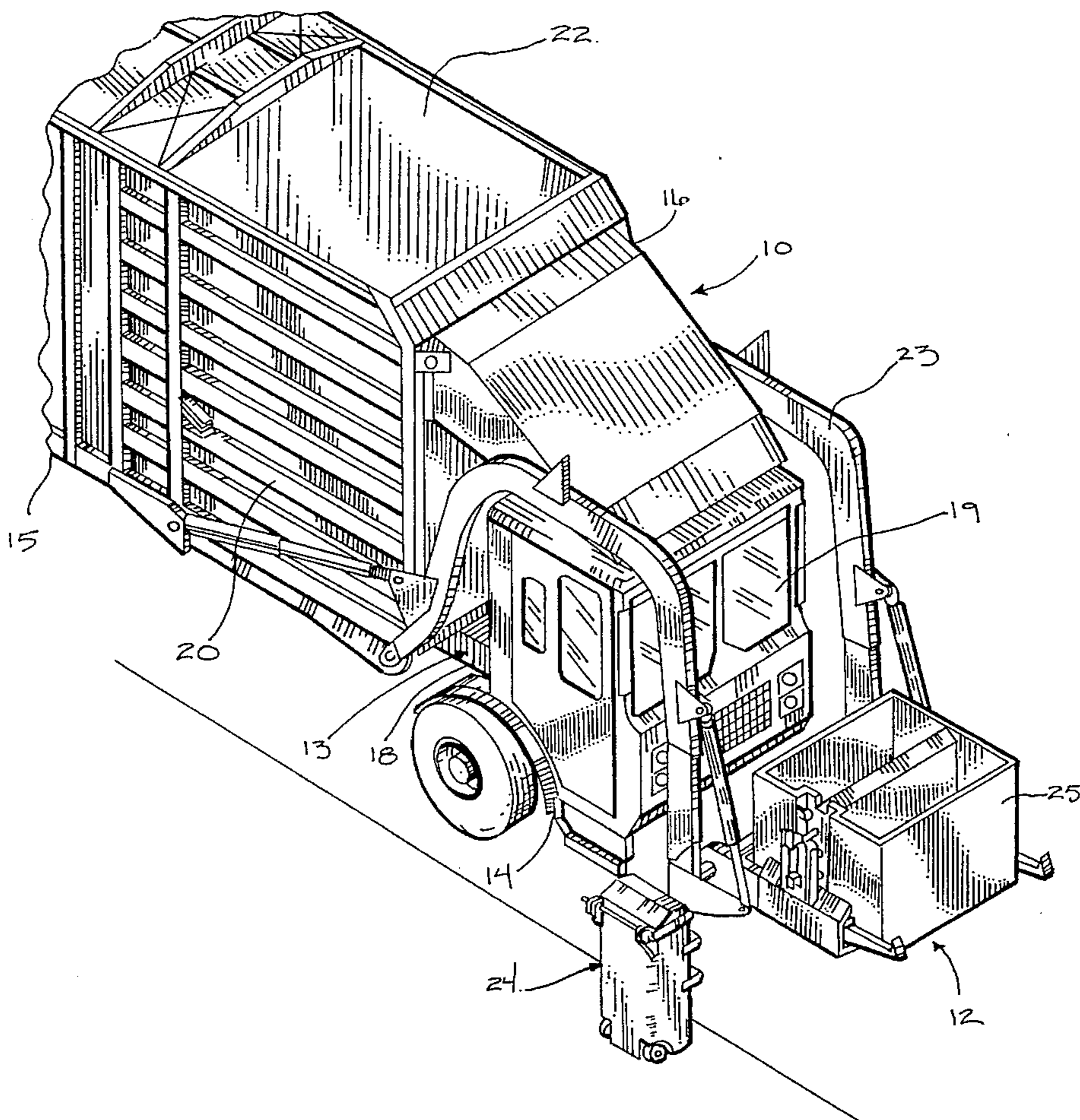
3,136,436	6/1964	Erlinder et al.	414/409
3,576,265	4/1971	Brady	414/408 X
3,762,586	10/1973	Updike, Jr.	414/408
3,822,802	7/1974	Evans, Jr.	414/501
4,042,137	8/1977	Hughes et al.	414/409 X

Primary Examiner—Michael S. Huppert
Assistant Examiner—James W. Keenan
Attorney, Agent, or Firm—Parsons & Associates; Don J. Flickinger; Robert A. Parsons

[57] ABSTRACT

An intermediate container which may be attached to a lift assembly of a refuse collection vehicle, and having a side arm assembly attached thereto for emptying refuse containers. The side arm assembly includes an extendable arm coupled to the intermediate container, terminating in a tilt assembly and a grabber assembly. The grabber assembly engages a refuse container, which is drawn to the intermediate container where the tilt assembly empties the refuse container.

9 Claims, 6 Drawing Sheets



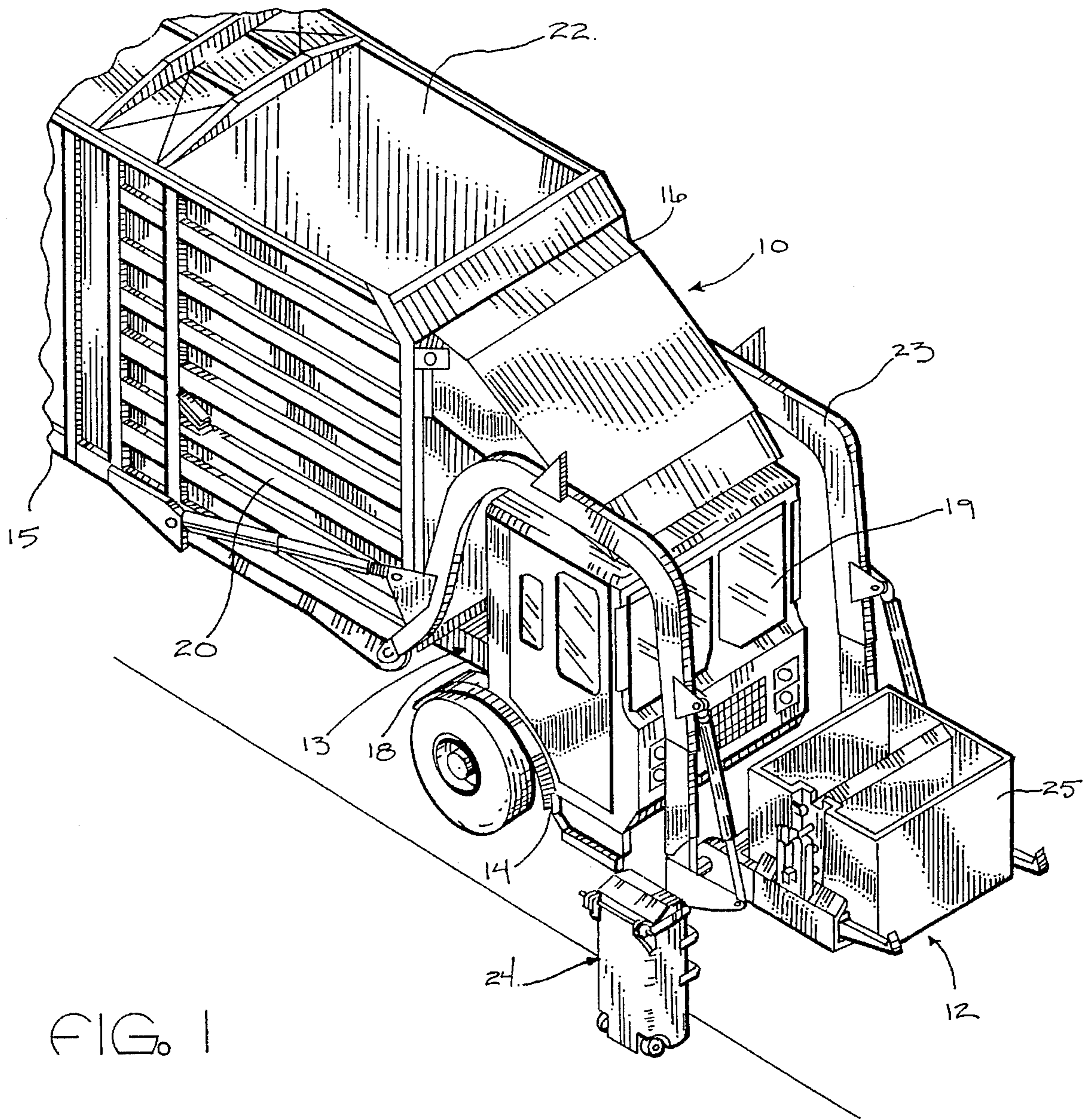


FIG. 1

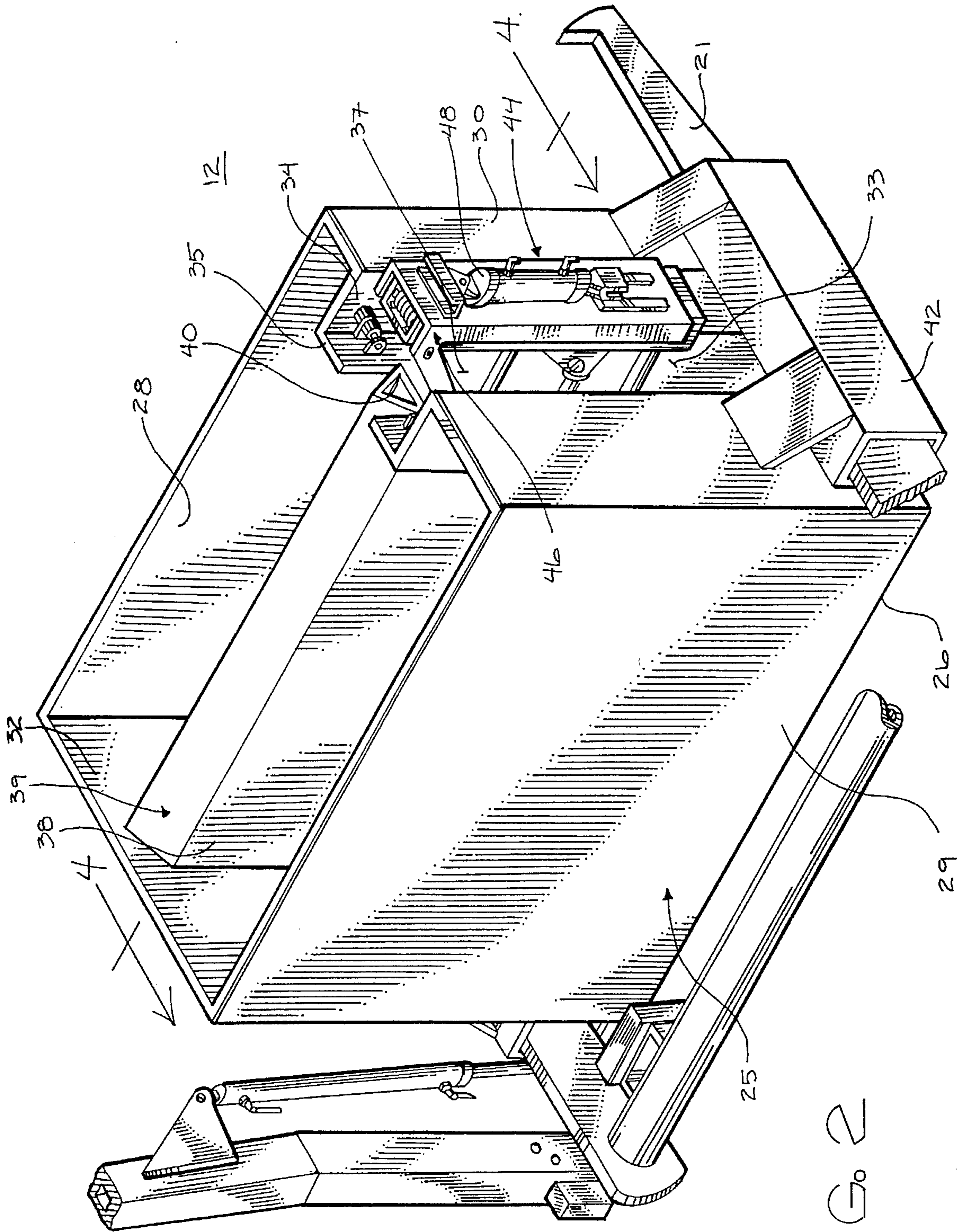


FIG. 2

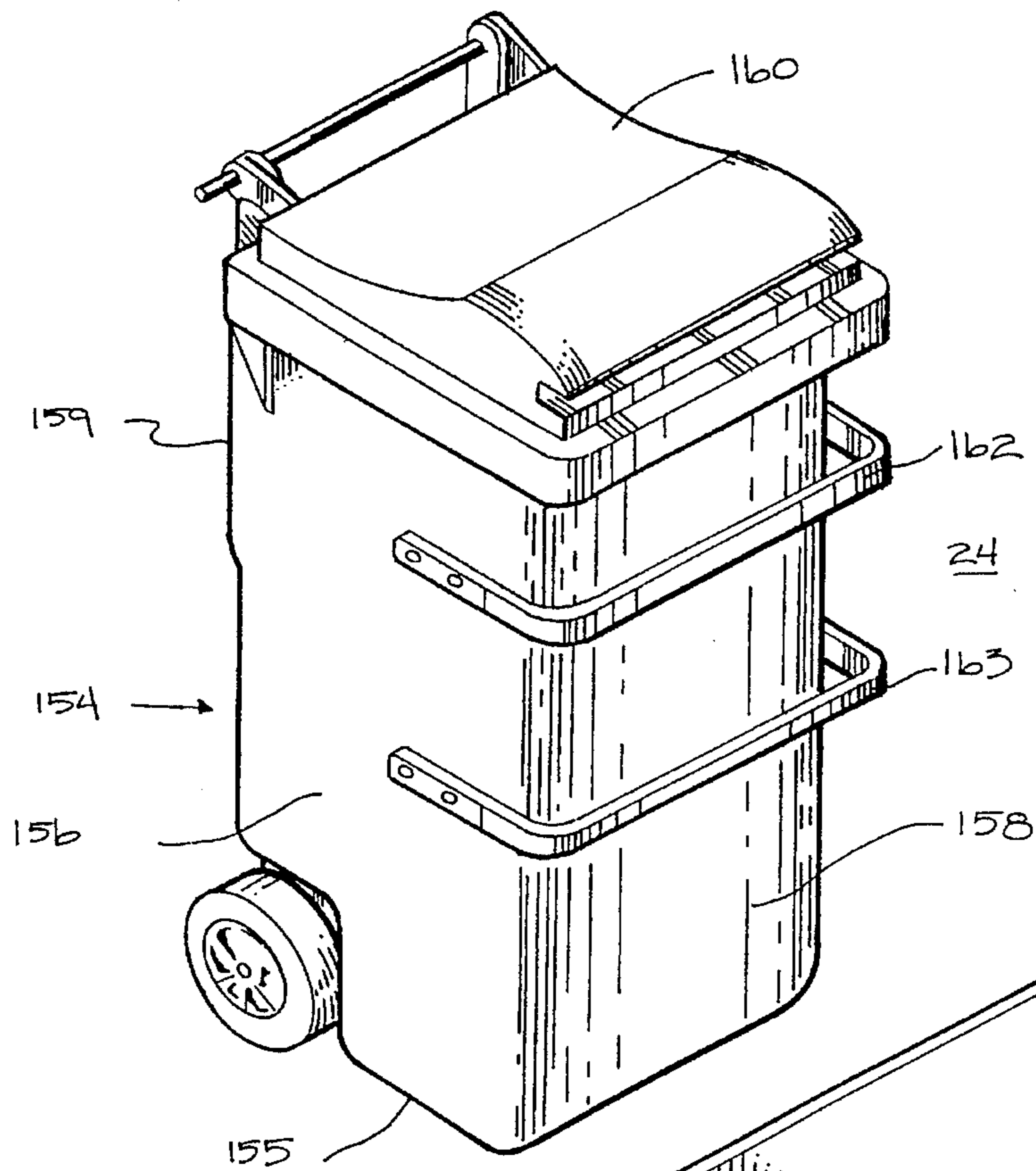


FIG. 3

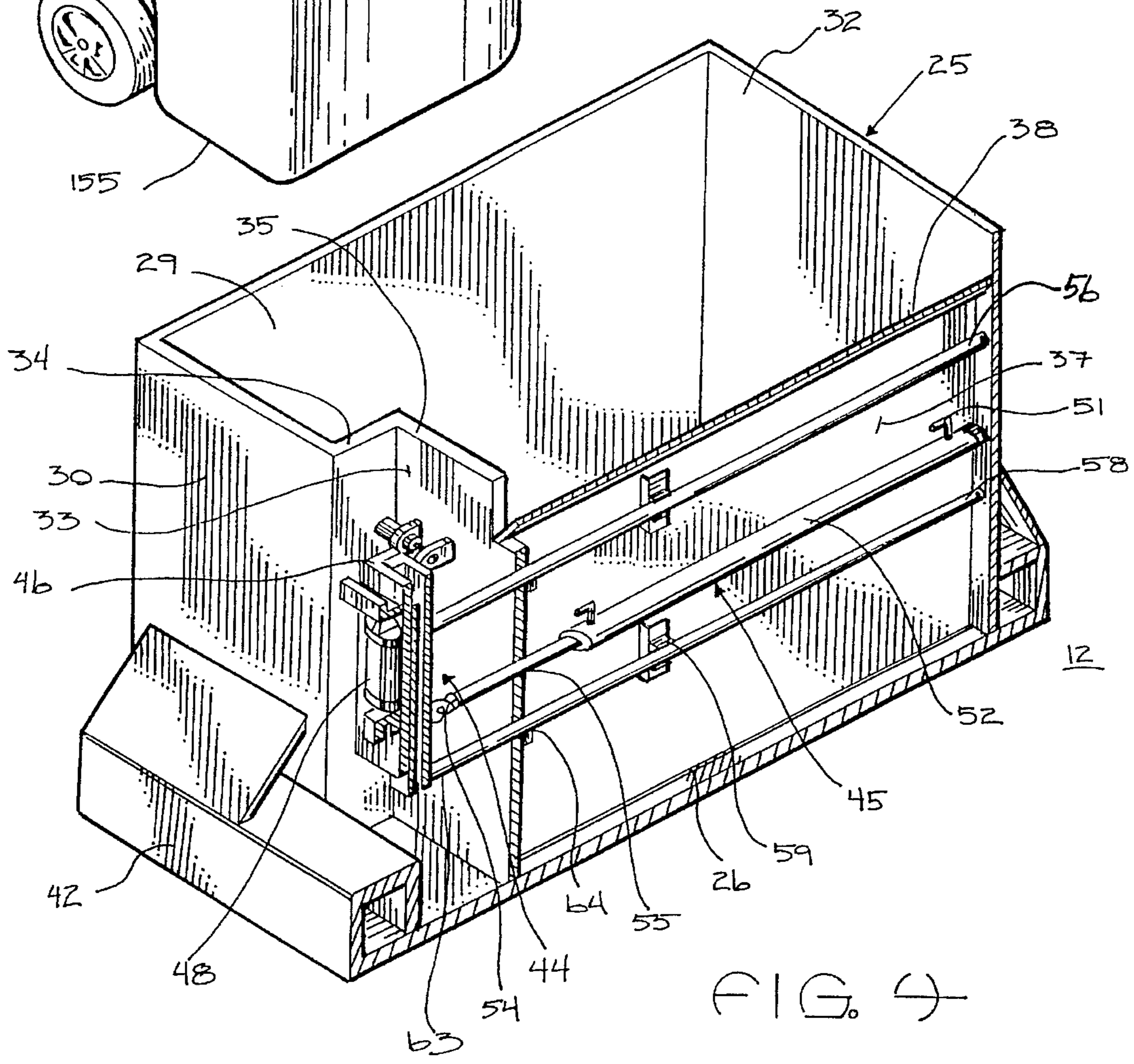


FIG. 4

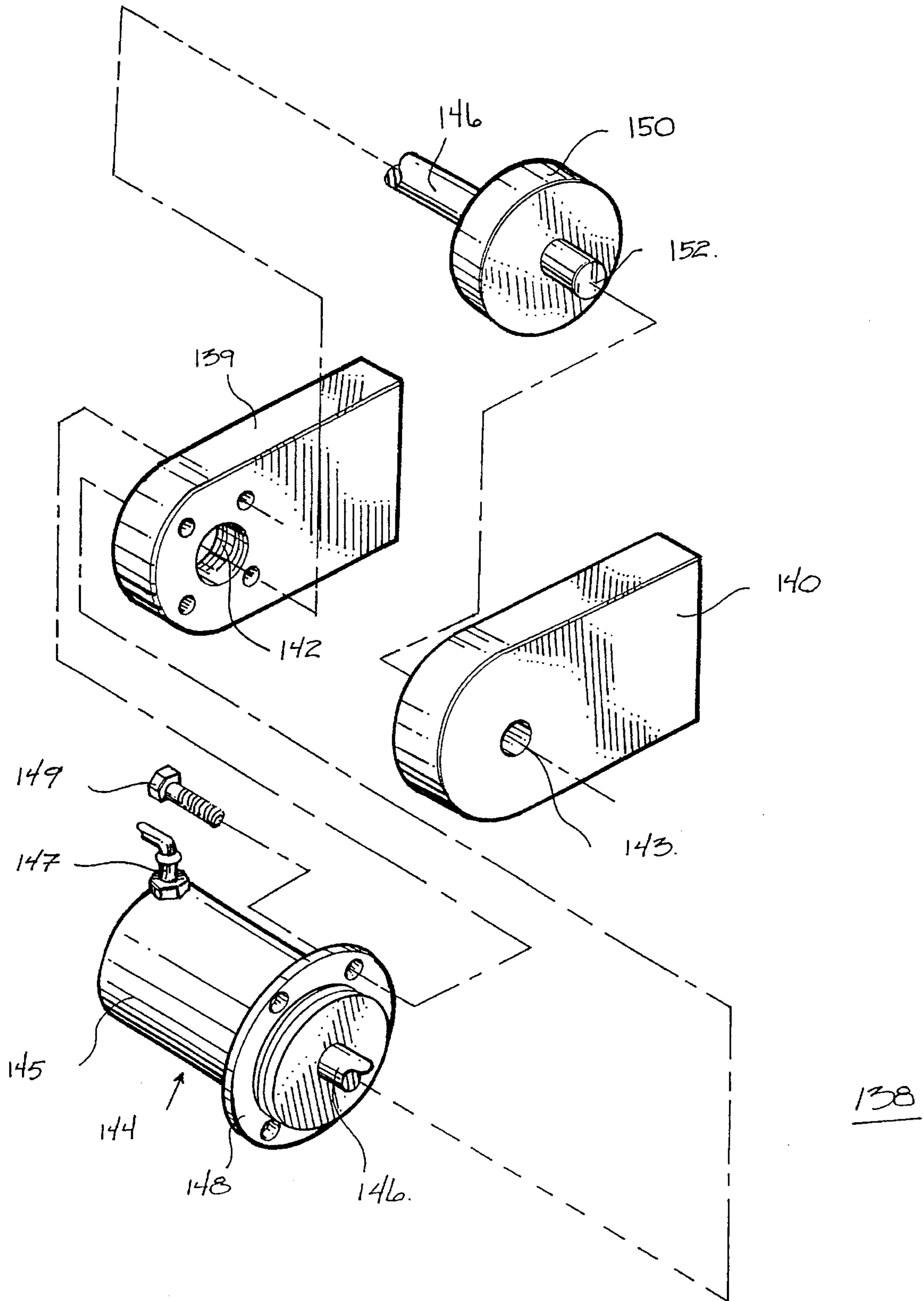


FIG. 6

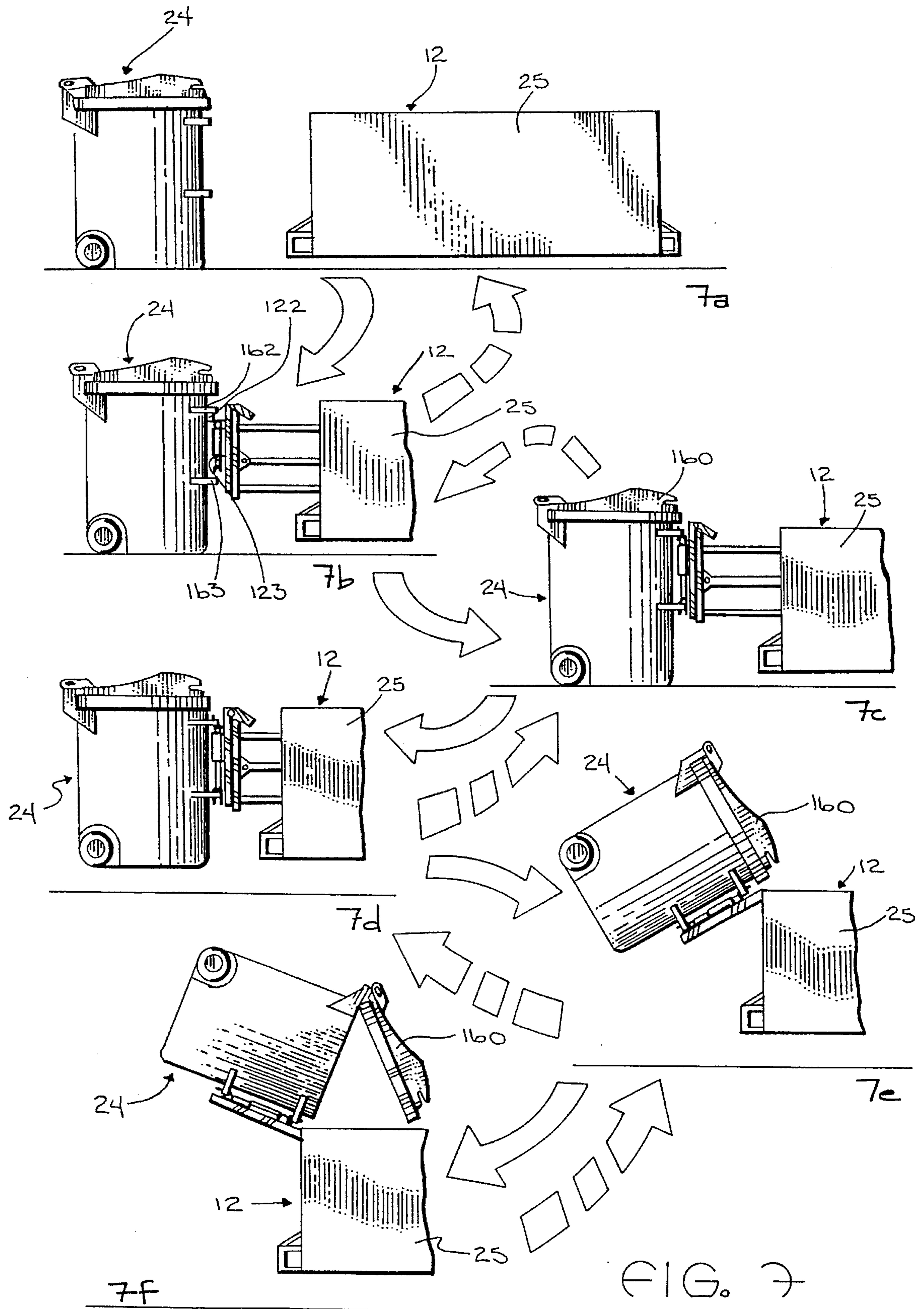


FIG. 7

MOTOR POWERED INTERMEDIATE CONTAINER AND METHOD OF USE

This application is a continuation of application Ser. No. 07/877,488, filed May 1, 1992, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to refuse collection devices.

More particularly, the present invention relates to refuse vehicles utilizing motor powered systems for dumping containers.

In a further more specific aspect, the instant invention concerns a sidearm assembly on an intermediate container for a front end loading refuse vehicle

2. Prior Art

The disposal of refuse has always been a problem in populated areas. This problem has increased with the filling and closure of land fills. Generally, refuse collected by individual households are stored in a relatively small can or refuse container. Periodically these containers are placed so they can be dumped into a larger container and transported to a land fill or other refuse destination. There are a number of devices for collecting refuse from these relatively small containers. A truck is generally employed, having a large bin into which the containers are emptied. Many vehicles employ compactors which compact the refuse collected in the bins. The refuse is transferred into the bin in a large variety of different ways. The individuals operating the trucks can simply pick up the smaller containers and dump them into the vehicle, or mechanical assemblies can be used to dump the containers into the bin.

Each of these methods have problems associated with them. When the truck operators dump the containers by hand, the size and weight of the containers when full are limited to a size easily handled by an average man. For many households, this requires more than one container, since all of the accumulated refuse may not fit in one of the relatively small containers. Therefore, it takes considerable time to collect the refuse from each stop.

When mechanical devices are used to dump the containers, larger cans may be used requiring only a single transfer of refuse at each stop. However, these mechanical devices, usually consisting of arms which close around the container, are very expensive and require specialized vehicles. Furthermore, while these vehicles may be satisfactory for collecting refuse in rural areas where refuse collection points are widely separated, in urban areas having collection points much closer together, the need to dump each individual load from each collection point into the main bin of a vehicle is inefficient. It generally requires a great deal of time for a collection device to cycle through its entire collection process. A further problem with these collection devices is that only relatively small containers can be dumped. Due to the large volume of refuse, small individual refuse containers would be impractical for industries and large housing complexes. Therefore, large dumpsters are generally used to collect refuse. However, these dumpsters cannot be collected and dumped by the same vehicle which dump the smaller containers. Therefore specialized vehicles, which have hydraulically operated arms capable of engaging the large dumpsters and emptying them in their refuse bin must be used. The vehicle generally loads from the front, since the driver must be able to see the dumpsters in order to engage the dumpsters with the arms. Again, these vehicles are very

expensive and specialize in the large dumpsters. This specialization prevents them from collecting and dumping smaller containers.

Therefore, a refuse collection company collecting refuse from large housing complexes such as apartments and from industry as well as from individual homes, would require at least two types of trucks. This can significantly increase the cost of operation.

It would be highly advantageous, therefore, to remedy the foregoing and other deficiencies inherent in the prior art. Accordingly, it is an object of the present invention to provide a new and improved refuse collection device.

Another object of the instant invention is to provide a new method of collecting refuse.

And another object of the present invention is to provide a refuse collection device which will convert a vehicle which normally collects large dumpsters into a vehicle which can collect smaller containers.

Still another object of the present invention is to provide a refuse collection device which would reduce the amount of time required for refuse collection.

Yet another object of the invention is to provide a refuse collection device which would promote more efficient use of equipment.

Yet still another object of the invention is to provide a relatively inexpensive attachment, as opposed to providing a separate vehicle.

A further object of the instant invention is to provide a refuse collection device which facilitates the dumping of heavy garbage containers.

And a further object of the present invention is to provide a new and improved grabber assembly for refuse collection devices.

Yet a further object of the present is to provide a refuse collection device which allows a front end loader to be loaded from the side.

SUMMARY OF THE INVENTION

Briefly, to achieve the desired objects of the instant invention in accordance with the preferred embodiment thereof, provided is an motor powered intermediate container for use with a refuse collection vehicle. The refuse collection vehicle includes a lift device coupled to the refuse collection vehicle for raising said motor powered intermediate container. The motor powered intermediate container includes an intermediate container attachable to the lift device and a sidearm assembly coupled to the intermediate container for emptying refuse into the intermediate container. The side arm assembly includes an extendable arm coupled to the intermediate container and having a terminal end. A tilt assembly for up ending the refuse container so as to empty its contents into the intermediate container is coupled to the terminal end of the extendable arm. A grabber assembly which engages the refuse container is coupled to the tilt assembly.

A method for collecting refuse includes the steps of providing a refuse collection vehicle having a lift device, an intermediate container coupled to the lift device and a sidearm assembly coupled to the intermediate container. The refuse collection vehicle is then positioned adjacent a refuse container and the sidearm assembly is activated to engage the refuse container and empty it into the intermediate container.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and further and more specific objects and advantages of the instant invention will become readily apparent to those skilled in the art from the following detailed description of the preferred embodiment thereof, taken in conjunction with the drawings, in which:

FIG. 1 is a perspective view of a refuse collection vehicle employing a sidearm assembly, constructed in accordance with the teachings of the instant invention, as it would appear immediately prior to engagement with a refuse container;

FIG. 2 is a perspective view of an motor powered intermediate container coupled to a lift mechanism;

FIG. 3 is a perspective view of a refuse container for use with the motor powered intermediate container;

FIG. 4 is a cross sectional side view in perspective, taken along line 4—4 of FIG. 2;

FIG. 5 is an exploded perspective view of the sidearm assembly of the present invention;

FIG. 6 is an exploded perspective view of a cam follower; and

FIG. 7 illustrate the steps involved in engaging and emptying a refuse container into the intermediate container of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawings in which like reference characters indicate corresponding elements throughout the several views, attention is first directed to FIG. 1 which illustrates a refuse collection vehicle generally designated 10 employing an motor powered intermediate container generally designated 12. Refuse collection vehicle 10 includes chassis 13, which, for purposes of orientation throughout the ensuing discussion, is considered to have a forward end 14, a rearward end 15, a left or street side 16, and a right or curb side 18. A cab 19 is carried at forward end 14 of chassis 13. A refuse collection body 20 is carried upon chassis 13 at a generally rearward location. Body 20 is a hollow refuse receiving and storage receptacle. A hopper 22 is integral with the forward portion of body 20. Hopper 22 receives refuse from motor powered intermediate container 12, and may contain a compactor (not shown) to compact the refuse and move it into body 20. However, those skilled in the art will understand that body 20 may simply be an open receptacle. A lift arm 23 pivotally coupled to body 20 and extending forward past cab 19, pivots about a fixed axis. In the lower position free end 21 of lift arm 23 is engageable with motor powered intermediate container 12. In the elevated position, lift arm 23 positions the motor powered intermediate container for dumping into hopper 22.

While FIG. 1 illustrates motor powered intermediate container 12 being used with a refuse collection vehicle 10 having body 20 and forwardly extending lift arms 23, those skilled in the art will understand that other refuse vehicles may be employed. For example, a refuse collection vehicle having a loading mechanism extending from the front back or sides may be used in combination with the motor powered intermediate container. Furthermore, a vehicle without a refuse collection body and only a lifting mechanism may also be used in combination with motor powered intermediate container 12. In this last instance, the vehicle would simply carry an motor powered intermediate container 12 for use as a portable refuse collection unit.

Referring now to FIG. 2 motor powered intermediate container 12 is illustrated coupled to lift arm 23. Motor powered intermediate container 12 includes an intermediate container 25 having a bottom 26, a forward wall 28, a rearward wall 29, a curb side wall 30 and street side wall 32 forming a generally rectangular container having an open top. A recess 33 is formed in curb side wall 30, and defined by inwardly directed side walls 34 extending perpendicularly inwardly from curb side wall 30. Side walls 34 are joined by a recessed wall 35 recessed inwardly from and parallel to curb side wall 30.

Intermediate container 25 is divided by a pair of parallel spaced apart tunnel walls 38 defining a tunnel 36 therebetween. Tunnel walls 38 extend between recessed wall 35 and street side wall 32 parallel to forward wall 38 and rearward wall 29. The top of tunnel 37 is closed by a tunnel cover 39 having downward sloping sides 40, to prevent collection of refuse thereon.

Attachment members 42 are coupled to curb side wall 30 and street side wall 32 proximate bottom 26 for receiving free ends 21 of lift arm 23. Attachment members 42, in this embodiment, are square tubes extending substantially the width of curb side wall 30 and street side wall 32, and are configured to receive free end 21 of lift arm 23. The configuration of attachment members 42 allows automated intermediate container 12 to be easily attached to and detached from lift arms 23.

Still referring to FIG. 2, a sidearm assembly generally designated 44 is coupled to intermediate container 25 in recess 33. Sidearm assembly 44 includes an extendable arm 45, a tilt assembly 46, and a grabber assembly 48. With further reference to FIG. 4, extendable arm 45 is an extendable actuator, which in this preferred embodiment is a cylinder assembly 50. Cylinder assembly 50 includes a double acting cylinder 52 coupled to tunnel walls 38 inside tunnel 37, and reciprocally movable operating rod 53 which is extendable or retractable in response to the introduction of pressurized fluid or gas into cylinder 52 through one of intake ports 51 in accordance with conventional practice. Operating rod 53 has a terminal end 54 extending into recess 33 through an opening 55 formed in recessed wall 35. Guide members 56 and 58 are mounted for reciprocal movement corresponding to operating rod 53. Guide members 56 and 58 are slidably mounted to side walls 34 using guides or pillow blocks 59. Guide member 56 is located in tunnel 37 above cylinder assembly 50 and has a terminal end 60 extending through an opening 62 in recessed wall 35. Guide member 58 is mounted below cylinder assembly 50, and has a terminal end 63 which extends into recess 33 through an opening 64 in recessed wall 35.

Referring now to FIG. 5, an end plate 70, generally configured as a rectangular tube, having sidewalls 71, a front or curb side surface 72, a back or street side surface 73, an upper end 74, and a lower end 75 is coupled to guide members 56 and 58, and to operating rod 53. Terminal end 60 and 63 of guide members 56 and 58 are attached to back surface 73 near upper end 74 and lower end 75 respectively. Terminal end 54 of operating rod 53 is coupled to back surface 73 of end plate 70 between guide members 56 and 58.

It can be seen that a bifurcated bracket 76 extends from back surface 73 of end plate 70 medially between upper end 74 and lower end 75. Terminal end 54 of operating rod 53 has an eye 78 coupled thereto. A collar 79 extends from bifurcated bracket 76, and has a pin hole 80 extending therethrough. Eye 78 is secured in bifurcated brackets 76 by

a shaft **82** extending through collar **79**, bifurcated bracket **76** and eye **78**. A pin hole **83** is formed in shaft **82** concentric with pin hole **80** in collar **79**. A pin **84** inserted through pin hole **80** and pin hole **83** retains shaft **82** in bifurcated bracket **76**.

A tilt assembly consisting of tilt plate **90** cams **92** and **93**, and torsional springs **94** is pivotally coupled to the upper end **74** of end plate **70**. Tilt plate **90**, in this embodiment, is a channel beam having a front surface **98**, a back surface **99**, and upper end **100**, a lower end **102** and two flanges **103** and **104** extending from back surface **99**. Cams **92** and **93** extend outwardly from upper end **100** of flanges **103** and **104** respectively, at a downward angle. Shaft openings **105** and **106**, formed at the junction of cams **92** and **93** with flanges **103** and **104** respectively, define the pivot point of tilt plate **90**. Friction bearings **108** and **109**, which may be bronze bushings, are receivable within shaft openings **105** and **106** respectively.

A recess **100** is formed in upper portion **74** of end plate **70** to house torsional springs **94**. A bore **112** is formed through upper end **74** of end plate **70** through side walls **71**, with tubular spacers **113** extending bore **112** outwardly from end plate **70**. Back surface **99** of tilt plate **90** is placed flush with front surface **72** of end plate **70**, with flanges **103** and **104** overlapping side walls **71** of end plate **70** in a parallel spaced apart relation. Shaft openings **105** and **106** are concentric with bore **112**. A shaft **114** is inserted through shaft openings **105** and **106** into bore **112**. Shaft **114** also passes through and holds torsional springs **94** in recess **110**. A pin **115** extends through tubular spacers **113** and shaft **114** to prevent movement of shaft **114**.

Torsional springs **94** include an arm **118** which is anchored against the inner portion of front surface **72**, and a spring arm **119** which contacts back surface **99** of tilt plate **90**. When spring plate **90** is pivoted about shaft **114**, torsional force builds up in torsional spring **94**. The release of torsional force when torsional springs **94** relax pivots tilt plate **90** back to its lowered position.

A grabber assembly comprising a spreader actuator, which in this embodiment is a double acting cylinder **120**, an upper grabber **122**, and a lower grabber **123** is attached to the front surface **98** of tilt plate **90**. Upper grabber **122** has an upper surface configured to engage a refuse container which will be described in greater detail below, and a lower surface from which projects a bifurcated mounting bracket **124**. Cylinder assembly **120** includes a cylinder **125** and reciprocally movable operating rod **126** which is extendable or retractable in response to the introduction of pressurized fluid or gas to cylinder **125** through one of intake ports **127** in accordance with conventional practice. Cylinder **125** terminates at one end with attachment member **128**. Attachment member **128** is secured to bifurcated bracket **124** by shaft and pin assembly **129**. Operating rod **126** terminates at the free end with a threadably attached bifurcated bracket **170**. Lower grabber **123** has a first end configured to engage a refuse container, flanges **134** extending from a side adjacent front surface **98**, and an opposing end terminating in an attachment member **132** secured to bifurcated bracket **130** by a shaft and pin assembly **133**. A slide track **135** is fastened proximate lower end **102** of tilt plate **90**. Grabber assembly **48** is attached to front surface **98** of tilt plate **90** by attaching upper grabber **122** to front surface **98** proximate upper end **100** of tilt plate **90**, and inserting flanges **134** extending from lower grabber **123** into slide track **135**.

A pair of cam follower assemblies **138** one of which is illustrated in FIG. **6**, are coupled to recessed wall **35** of

recess **33**, one on each side of extendable arm **45**. For each cam follower assembly **138**, an attachment member **139** and receiving member **140** extend from recess wall **35** in a parallel spaced apart relationship. A bore **142** extends through attachment member **139**, and is concentric with a receiving bore **143** extending through receiving member **140**. A cylinder assembly **144** is attached to each of attachment members **139**. Each cylinder assembly **144** includes single acting cylinder **145** and reciprocating operating rod **146** which is extendable in response to the introduction of pressurized fluid or gas into cylinder **145** through intake port **147** in accordance with conventional practice. Cylinder **145** terminates, at an end from which reciprocating rod **146** extends, with an annular flange **148** secured to attachment member **139** by a set of bolts **149**. Reciprocating rod **146** extends from cylinder **145** through bore **142**, and carries cam follower **150** proximate its terminal end **152**. With cylinder assembly **144** in its retracted position, a space exist between terminal end **152** of reciprocating rod **146**. In response to the introduction of a pressurized fluid or gas into cylinder **145**, reciprocating rod **146** is extended towards receiving member **140**. When fully extended, terminal end **152** of reciprocating rod **46** is received in receiving bore **143**. FIG. **6** illustrates a single cam follower assembly **138**, however, two cam follower assemblies **138** are employed in the preferred embodiment, with a cam follower assembly **138** located on both sides of extendable arm **45**.

It will be understood by those skilled in the art that while motor powered intermediate container **12** is illustrated in combination with a front loading refuse collection vehicle, any vehicle having a lift device may be used. Furthermore, those skilled in the art will understand that sidearm assembly **44** may be mounted in various locations on intermediate container **25**. An example would be to mount sidearm assembly **44** on forward wall **28** with tilt assembly **46** and grabber assembly **48** offset towards rearward wall **29** to ensure that refuse container **24** is dumped into intermediate container **25**.

Various means for controllably supplying pressurized hydraulic fluid or gas to the various actuating elements for operation of the structure of the instant invention will readily occur to those skilled in the art. The instant invention contemplates using conventional hydraulic systems and controls, which are considered to be apparent to those skilled in the art and therefore omitted so as not to unduly complicate the drawings.

Referring now to FIG. **3**, refuse container **24**, for use with motor powered intermediate container **12** is illustrated. Refuse container **24** consists of a body **154** having a bottom **155**, side walls **156**, a front wall **158**, and a back wall **159**. A cover **160** is hingedly attached to back wall **159** to close body **154**. An upper grab bar **162** and a lower grab bar **163** are fixed to front wall **158** in a parallel spaced apart relationship. Grab bars **162** and **163** extend horizontally across and are outset from front wall **158**. Grab bars **162** and **163** are generally placed in the middle of body **154** to approximate a balance point. Upper grab bar **162** and lower grab bar **163** are spaced apart a distance sufficient to permit grabber assembly **48**, in its retracted position, to be inserted therebetween.

Referring now to FIG. **7a-f**, the steps in engaging and emptying refuse container **24** are illustrated. FIG. **7a** illustrates automated intermediate container **12** positioned adjacent refuse container **24**, with sidearm assembly **44** in a retracted position. In its retracted position, sidearm assembly **44** fits into recess **33**. Extendable arm **45** is fully retracted, with cams **92** and **93** disengaged from cam followers **150**,

which are retracted. Motor powered intermediate container 12 is maintained a given distance above the ground by lift arms 23. This allows refuse vehicle 10 to move without damaging motor powered intermediate container 12.

FIG. 7b illustrates the extension of extendable arm 45 by activating cylinder assembly 50 which extends operating rod 53. Extendable arm 45 is extended until grabber assembly 48 is positioned between upper grab bar 162 and lower grab bar 163. Lift arms 23 are then raised a distance sufficient to engage upper grabber 122 with upper grab bar 162. Referring now to FIG. 7c, cylinder assembly 120 is activated, extending operating rod 126. This engages lower grabber 123 to lower grab bar 163. The spreading of upper grabber 122 and lower grabber 123 securely attaches refuse container 24 to sidearm assembly 44.

Motor powered intermediate container 12 is then raised by raising lift arms 23, lifting refuse container 24 from the ground as illustrated in FIG. 70. When refuse container 24 has been lifted, extendable arm 45 is retracted by activating cylinder 52 and retracting operating rod 53. This draws refuse container 24 towards intermediate container 25. When extendable arm 45 is being retracted, cam followers 150 are placed in position to engage cams 92 and 93. This is accomplished by activating cylinder 145 causing rod 146 to extend and be received by receiving bore 143 of receiving member 140.

Referring now FIG. 7e, extendable arm 45 is retracted until cams 92 and 93 contact cam followers 150. As extendable arm 45 continues to retract, cam followers 150 force cams 92 and 93 downward, swinging tilt plate 90 with attached refuse container 24 upward. When tilt plate 90 reaches the proper elevation, cover 160 of refuse container 24 swings open allowing refuse to empty from body 154. When tilt plate 90 swings upward, a torsional force is build up in torsional spring 94. To lower the refuse container 24, extendable arm 45 is again extended allowing cams 92 and 93 to disengage from cam followers 150. The relaxing of torsional spring 94 assist gravity in lowering tilt plate 90. Refuse container 24 is then replaced adjacent motor powered intermediate container 12 by the reversal of steps 7a through 7f as discussed above.

Various changes and modifications to the embodiment herein chosen for purposes of illustration will readily occur to those skilled in the art. To the extent that such modifications and variations do not depart from the spirit of the invention, they are intended to be included within the scope thereof which is assessed only by a fair interpretation of the following claims.

Having fully described the invention in such clear and concise terms as to enable those skilled in the art to understand and practice the same, the invention claimed is:

1. An motor powered intermediate container in combination with a refuse collection vehicle, wherein said refuse collection vehicle includes forwardly extending arms suitable for engaging, lifting and emptying directly into said vehicle a front loader refuse container filled with refuse, said motor powered intermediate container comprising:

an intermediate container carried by said forwardly extending arms; said intermediate container having support means for supporting said intermediate container on said forwardly extending arms;

an assembly extendable to the curb side of the vehicle and carried by said intermediate container;

said assembly having motor powered means including a dumping assembly and an extendable element carrying an engagement assembly;

said dumping assembly having motor powered means to empty the contents of a curb side refuse container into said intermediate container;

said engagement assembly having motor powered means to hold the refuse container during the emptying operation; and

said extendable element having motor powered means to extend said extendable element and said engagement assembly into engagement with the refuse container, whereby the use of said motor powered intermediate container converts said refuse collection vehicle from collection by lifting front loader refuse containers and emptying them directly into said vehicle to collection by collecting from curb side refuse containers to said intermediate container carried by said forwardly extending arms.

2. A motor powered intermediate container as claimed in claim 1 wherein said extendable assembly further comprises:

an extendable element coupled to an intermediate container and having a terminal end;

said dumping assembly having a tilt assembly coupled to said terminal end; and

said engagement assembly having a grabber assembly coupled to said tilt assembly.

3. A motor powered intermediate container as claimed in claim 2 wherein said extendable element further comprises an extendable actuator device and guide members coupled to said intermediate container and said terminal end.

4. A motor powered intermediate container as claimed in claim 3 wherein said terminal end is an end plate.

5. A motor powered intermediate container as claimed in claim 2 wherein said tilt assembly further comprises:

a tilt member pivotally coupled to said extendable element end; and

a tilting mechanism attached to said tilt member.

6. A motor powered intermediate container as claimed in claim 5 wherein said tilt mechanism includes a cam and cam follower, one of said cam and cam follower being attached to said tilt mechanism, and the other of said cam and cam follower being attached to said intermediate container.

7. A motor powered intermediate container as claimed in claim 2 wherein said grabber assembly further comprises:

a first grabber;

a second grabber; and

a spreader actuator spreadably coupling said first grabber to said second grabber.

8. A motor powered intermediate container as claimed in claim 7 wherein said spreader actuator is a hydraulic cylinder.

9. A motor powered intermediate container as claimed in claim 2 wherein said intermediate container has an attachment member for removably receiving said lift mechanism of said refuse collection vehicle.